Notebook, N-02-04-12

N-(02)-04-12

(XE-172)

W H Haines

Edison Labarotory

Job 12.43

April 12

Setup Wheatstone bridge + D'Arsonval galv + measured the res of a number of coils + marked them with their res. Found one coil with Pb core had a short circuit in the core + sent it up to be repaired.

April 13

Fixed up two Thompson double coil astatic galvanometers one aperiodic + one ballistic ~~[illegible]~~ put in suspensions of cocoon fibre + cleaned them up. Pt coil returned O.K. Mr. Ott + myself put some wire across galv. room to supply current for electric furnace. Used two lamp banks of about 35 amps each to regulate current. Found that current was insufficient + got two coil res boxes

There were two furnaces constructed first a vertical furnace with 5/8" carbon + a graphite crucible turned out of a 2½" x 2½" x 2½" cube I found that with this furnace it was impossible to fuse Ni with any reasonable amount of current as the graphite conducted the heat away very rapidly

April 15 Horizontal furnace
Fire brick + linings for "

The second furnace was a horizontal furnace + with 5/8" carbons The body of the f was made of two dolomite blocks which cracked all to pieces after the current was on only a very few minutes rendering the furnace useless

Next used a silica fire brick hollowed out + lined with quick lime ground up + stuck together with coal tar. The fire brick did not crack at all + the lining stood the heat very well except where it was thin round the edge where it came in contact with the brick + melted down the silica + lime combining + forming an easily fusible glass. The lining of CaO was not all that could be desired it being quite fragile

Next tried a magnesia brick this cracked some but not so as to render it useless + it conducted heat some more so than the silica brick so that it required some ~~non~~ nonconducting lining

Tried a lining of calcined MgO with tar was more tender + scales off.

Tried calcium acetate + lime + also poured acetic acid on the lime this gave a very spongy mass that was much more tender than lime & + tar but appeared to be even a better non conductor of heat.

april 16

Started making alloys of Ni + Sb starting with 5% of Sb + increasing it to 95% by amounts of 5% using a total weight of both metals of 20g. weighed to .01 gram

The Ni was melted first + then the Sb added. there was ~~[illegible]~~ concidrable heat produced in all cases by the combination especially around the proportions of Ni 13 to Sb 7

Alloys containing over 50% Sb extremely brittle so that they would sometimes break when dropped on the wooden floor

Made alloy of Ni 8 Sb 12

[illegible] would make the [illegible] time

[illegible]

[illegible] Ni + Sb 13
[illegible]
[illegible] finally [illegible]
[illegible]
[illegible]
[illegible]
Crucible [illegible] & then [illegible]
[illegible]
[illegible] & all
[illegible]

Finished Ni Sb alloys at noon & started Ni + Cu & finished 13 of them

April 18

Finished Ni + Cu at 11^{00} & started Ni + Co & did 16 of them. Thought it unnecessary to weigh the alloys as both metals are not volatile at tem used. One of the constituents seemed to flux with the lime slightly so the crucible to be replaced after a few fusions.
~~[illegible] tin & started [illegible]~~
~~[illegible] 2 of the [illegible]~~
~~[illegible] with [illegible] crucible~~

April 19.

Started on Ni 3 Co 17 These alloys containing a large percentage of Co become full of blow holes on cooling + fuse at a very high temp apparently higher than the fusing point of Ni but then I found that the fusing point of Co was extremely high it must be near that of Pt.

Started Ni + Sn about 11:00 a.m.

Gave a [illegible] to weigh for me who is very slow at it but suppose he will improve with practice.

Alloys with considerable tin pasty at red heat + not solid till a very dull red

Alloys with about 25% Sn seem to fuse at a lower temp than Sn

Finished 17 of the Sn Ni alloys at 5:15

April 21

Finished Ni + Sn + started on Ni + Zn the Zn either floats around on top of the Ni + oxidizes or goes into combination with it with a good deal of energy throwing the Ni around + volatizing ~~so~~ some of the Zn

Made three alloys of Ag + Brass Ag 6 grams Brass 2 g
wt. 9.87 " 6 " " 4g
11.77 " 6 " " 6g
for Mr E.

Found it impractible to make the alloys of Ni + Zn in furnace so only made them to Ni 9 Zn 11

The zinc was volatized + burned to oxide which made a conducting path from the electrodes to the magnesia fire brick which became conducting around the iron edge ~~som~~ this conductivity might be due to some compound formed by the ~~[illegible]~~ MgO or other constituents of the brick

with the ZnO. some time
the ~~the~~ ZnO & brick conducted
as much as 10 or 15 amperes
after the arc in the furnace
was broken.
Started on Ni & Pb
In morning Mr E. gave me
four note books like this with
lists of ~~of~~ alloys to make.
Did 7 of the Pb Ni alloys

Apr. 22

Started on Ni 12 Pb 8
Weighed out 69.65 grams of
Ag & same of Brass for
Mr Ott.
Finished Ni & Pb at 1 30 &
started Ni & Bi did to Ni 2 Bi

apr 23

Started on Ni 2 Bi 18 & finished Ni & Bi. Boy felt sick & went home at 3.45

Made up some lists of stuff required for the job.

Measured resistance of coils of a large electro magnet for Dr Ott.

Started on alloys of Ni & Al made first alloy Ni 10 Al 10 it was very spongy & brittle & there was some compound probably a carbide formed that gave off C_2H_2 when wet.

~~On One alloy when wet~~

The substance surrounding one alloy gave off NH_3 when wet the odor was quite noticiable & it turned red litmus paper blue.

Alloys of more than 50% Al attack the lime so much that there is very little alloy left the alloy is surrounded by a greyish mettallic looking mass ~~which is~~

Apr 24

Sick not at work

Apr 25

Weighed up the rest of the Ni Be alloys + some of Ni Al.

~~DO~~ The Al attacked the crue so much + gave such poor + uncertain results that I made no farther than Ni 8 Al 12. Started on Ni + Si made four + weighed them up + found that only one weighed as much as the Ni put in it

Started on Ni + Ag Made

Ni 19 18 17.16 5 + 4

Ag 1 2 3 4 15 + 16

found that alloy was not ~~homogen~~ homogenious it looked as if the Ni + Ag entirely separated on cooling so did not make any more. The Ag comm ~~to~~ boil or give off gas soon after melting so there is some Ag spattered out.

Started on Ag + Sn. Went best of any alloy yet finished at 6.00

apr 26

Morning made all Ag Pb alloys metals went together nicely but Pb would oxidize if charcoal were not used. Used open arc for about an hour to make some fluoresce for Mr E.
Afternoon started on Cu + Ag + finished these went very nicely used charcoal to prevent oxidation
Started Cu & Al first two went very nicely after that with more Al the Al attacked cruc forming carbide etc. & would not all go in Cu. Will have to do all Al alloys in some sort or cruc. that you can use cryolite or some other suitable flux for Al.
Started Cu+Zn made three a good deal of Zn volatilized

apr 28

Started Cu 16 Zn 4 had to use borax as flux & even then a good deal of Zn was volatized
Finished Cu + Zn at 2^{00} PM & started W+Ni alloys did first & then started at beginning of series See notes under W.Ni in other book.

W	Ni
14	6
10	10
6	14

Apr 29

Working on W Ni started
W 13 Ni 7 finished at 10.00 AM
see notes under W & Ni
Tried W + Bi & W + Sb with
no success see ~~under~~ notes
under W.
Started on W + Cu see under
W.

Apr 30

Finished W + Cu
Started on W + Fe see under
W.
~~Finished all Al + W alloys that~~
~~I started at [illegible] then worked~~
~~on Fe + W.~~

May 1

Changed some of the
wiring [illegible] to run
another furnace this took
all morning
Afternoon Mr. E. used arc
for flourescent expe for an
hour or so.
Then made some alloys of
Ag Cu Cd
Finished all Al W alloys
that I could do
Worked on W+Fe.

May 2

Finished up W + Fe.
Left at noon to go to Poughkeepsie
Louis Ott while I was away
made the following complete
Cu + Sn Cu + S.

May 6

Got back at 1^{00}
Made all W + Co + Cu + Co as
far as Cu 11 Co 9

May 7

Finished Cu + Co
Made Fe Co complete
Roy was busy most of time so
tested out X apparatus & made
diagram of connections.

May 8

Made Cu + Al complete
Made Co 14 Ag 6
" 10 " 10
" 6 " 14

found that they seperated out so did not make any more. Started on Al + Sn. & finished it.

May 9

Made all Co + Sb & ~~all Cu + As that~~ + 16 of Cu + As alloys also Ni + As

May 10
Made Fe Ni + Cu P as far as
Cu 10 P10 & Ni + P as far as
Ni 12 P8

May 12
Tried Al + Pb would not
go together.
Made Al + Sb as far as
Al 9 Sb 11 when carbon crucibles
gave out.
Sb + P as far as Sb 14 P6
Bi + P " " " Bi 16 P4
Zn + P - Zn 16 " "

May 13

Tried W + Pb would not alloy

" W + P heat so great that

at P was volatilized.

Ni + S to Ni 12 S8

Also fixed up X ray trans.

& put oil into it.

May 14

Tried Cu + Cd see notes under

Cu + Cd

Bi + S :

Cr + Ni complete

Mn + Ni " "

Cu + Mn to Cu8 . Mn 12

May 13.

Finished Cu + Mn.
Made all Fe + Cu
" four Fe + P
" two Fe + Bi
" 13 Fe + Sb

May 16

Fe + Sn complete
Fe + Pb 2
Co + Sn complete
Co + Bi 8

May 17

Co + P	first	5
Co + S	"	5
Fe + S	"	9
Al + As		3

May 19

Fe + CR complete
Finished up AL + SB
which I had to leave
uncompleted on account
of lack of carbon
crucibles
AL + Bi 10
AL + AG 14 finished

May 20

Finished AL + AG
Bi + AG 11 used up all AG
Fe + ferro manganese 18
AL + Co Complete
In making AL 15 Co 5
there was a compound formed
that resembled graphite but
was too hard to be g.

May 21

Cu + Si 6
Fe + Si 5
Ni + Si
Si + Co
Afternoon worked on
coherer transmitter
May 22 same.

Small amount of filings Ag

Size of filings	No cohes	small cohesion	large cohesion
140-160			
160-180	poor rattle	worse	very faint
180-200	loud rattle	rattle faint	none except spark
200	loud rattle	rattle faint no r.	or ~~faint~~ faint no sound except spark

Medium amount of filings

140-160		not as loud	still less
160-180	poor rattle		less rattle
180-200	rattle faint little r.	fainter still r.	very faint no rattle
200	quite loud rattle	not so loud still rattle	faint no rattle

Used a transmitter consisting
of two plates of Ag on a phonograph diaphragm $\frac{10}{1000}$ thick
Small cohesion means that

~~for~~ static machine was discharging across a spark gap about 0.02 in long which was not connected to coherer Transmitter.
Strong cohesion ~~[illegible]~~ one side of spark connected to tran [illegible] between [illegible] & battery.
Found that I get better results with Ag using one cell of Lalande than with more

May 23
Tried gold plated lycopodium powder got no sound except the spark it does not cohere except with a strong spark directly connected to coherer when you can see the spark jumping through the mass it decoheres spontaneously.

Examined silver filings under microscope & found that they for the most part consisted of little curls which under the constant vibration of the diaphragm interlocked.
Had some filings by filing some very thin Ag sheets across the edge. These were less curly than the others. all went through 200 mesh works about same as ~~[illegible]~~ Ag 200 — made ~~[illegible]~~ with file from ~~a~~ a solid piece of Ag
After cohesion ~~a~~ removed the sound gradually increases.

Size of filings	kind	no cohesion	small cohesion	large cohes	remarks
200 —	Ag ~~filed~~ ground in mortar	medium rattles	very irregular rattle	no music only sparks	with small cohesion sometimes about same as no coherer [illegible]
200 —	Then sheets filed	loud rat.	not quite so loud	faint no rattle	small amount
"	"	good less rat.	about same as no.	weaker faint no rattle	larger " ~~[illegible]~~ best yet with large cohesion
~~180-200~~	~~"~~				
180-200	"	loud rat.	not quite so loud less rattle	best yet no rattle	small amount
80-140	Zn small amt	no sound	sound in bunches	sound in bunches	some sound after stopping strong cohesion
"	" large amt.	very faint	loud rattle + sound in bunches	sound less	strong rattle + sound after removing strong cohes dies ~~down~~ after a couple of minutes
80-140	Cd small amt	no sound	rattle in bunches sound in bunches after removing ~~cohesion~~ large cohes	no sound rattle in	bunches after removing cohes. gradually + move in the cont. loud rattle
"	" large amt.	loud sound + rattle at first gradually died out	sound at first grad. dies out on remov. cohes sound grad gets louder + suddenly ceases	Small cohes about same as large cohes.	

May 24
Experimented on Zn + Cd in
solenoid trans.
Finished up Bi + Ag
Sb + Ag complete

May 26 Exp on tel trans
with [illegible] [illegible] [illegible]
[illegible]
Req high voltage [illegible] could
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] of [illegible]
[illegible] [illegible] I am
[illegible] [illegible] [illegible]
[illegible] [illegible] May 27 150 [illegible]
[illegible] [illegible] battery [illegible]
[illegible]
9 M [illegible] [illegible] [illegible] the
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] Time
[illegible] [illegible] [illegible]
[illegible]
5 [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]

May 28 Went to Mlg to
see about [illegible] [illegible]
[illegible] [illegible] + to
consult [illegible] Seven [illegible]
[illegible] [illegible] design + get
[illegible] [illegible] [illegible]

May 29 Worked on the
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] understand [illegible]
Tried [illegible] [illegible] [illegible]
[illegible] circuit.

Ques 2 pieces of coke 150-130
e [illegible]
[illegible]
[illegible]
[illegible]
[illegible] of diaphragm
upward + make closer
contact [illegible]
[illegible]
[illegible]
[illegible] of coke
+ [illegible] graphite
+ anthracite heated to
redness.

Ques 3 [illegible]
[illegible]
[illegible]
[illegible] graph[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

Remove [illegible]
[illegible] graph
[illegible] 200 [illegible]
[illegible]
of [illegible]

[ITEM FOUND IN BOOK]

3 ag	1	Brass
3 ag	2	"
3 ag	3	"
6 g Ag	2	Brass
6 g Ag	4	Brass
6 g Ag	6	Brass